WHAT IS CLAIMED IS:

1. An apparatus for measuring transmittance or reflectance of a sample, comprising:

a source of radiation;

a sensor;

at least a first polygonal aperture for passing to the sensor radiation that is from the source and that has been transmitted through or reflected from the sample, said sensor responsive to the radiation through the aperture to provide an output;

a second polygonal aperture passing to the sensor radiation that is from the source and that has been transmitted through or reflected from the sample, said two apertures oriented so that they are rotated relative to each other by an angle to reduce stray radiation that reaches the sensor; and

a circuit providing a reading in response to the output.

2. The apparatus of claim 1, wherein said polygonal apertures are substantially triangular in shape.

3. The apparatus of claim 2, wherein the shapes of said polygonal apertures are substantially equilateral triangles.

4. The apparatus of claim 3, wherein the first and the second apertures are of dimensions that are substantially proportional to distances between the apertures and the sensor, and wherein the two apertures are oriented so that they are rotated by 60 degrees relative to each other.

5. An apparatus for measuring transmittance or reflectance of a sample, comprising:

a source of radiation;

a sensor;

at least a first and a second substantially equilateral triangular aperture for passing to the sensor radiation that is from the source and that has been transmitted through or reflected from the sample, said sensor responsive to the radiation through the aperture to provide an output; and

a circuit providing a reading in response to the output; said apparatus further comprising at least one color filter filtering the radiation from the source to the sensor so that the apparatus measures the radiance of the source within at least one predetermined spectral pass band.

6. The apparatus of claim 5, wherein said at least one color filter is such that the apparatus measures the radiance of the source within said at least one predetermined spectral pass band of a predetermined width within a range of 100 to 300 nm.

7. An apparatus for measuring transmittance or reflectance of a sample, comprising:

a source of radiation;

a sensor;

at least one aperture for passing to the sensor radiation that is from the source and that has been transmitted through or reflected from the sample, said sensor responsive to the radiation through the aperture to provide an output; and

a circuit providing a reading in response to the output, wherein said circuit includes an integrator and a sampling device that samples an output of the integrator at time intervals that are exponential functions of time to provide the reading.

8. The apparatus of claim 7, wherein the sampling device samples the output of the integrator at time intervals that are powers of 2 of time.

9. The apparatus of claim 7, said integrator having a substantially constant resolution at different signal levels.

10. The apparatus of claim 9, said circuit having a dynamic range, wherein said sampling device samples the output of the integrator and provides said reading when the output exceeds a predetermined value relative to the dynamic range.

11. The apparatus of claim 10, wherein the sampling device samples the output of the integrator at time intervals that are powers of 2 of time, and wherein said predetermined value is not more than half or one-third of the dynamic range.

12. The apparatus of claim 7, said integrator including an A/D converter.

13. The apparatus of claim 7, further comprising a collimating lens spaced at substantially a focal length from the first aperture, so that the lens focuses radiation from the source to the aperture.

14. An apparatus for measuring transmittance or reflectance of a sample, comprising:

a source of radiation;

a sensor;

at least one aperture for passing to the sensor radiation that is from the source and that has been transmitted through or reflected from the sample, said sensor responsive to the radiation through the aperture to provide an output;

a filter filtering radiation from the source received at the sensor, said filter having a frequency response that matches that of the human eye; and

a circuit providing a reading in response to the output.

15. The apparatus of claim 14, said filter being a Bessel filter with an integration period of about 1/3 second.

16. The apparatus of claim 14, further comprising a collimating lens spaced at substantially a focal length from the first aperture, so that the lens focuses radiation from the source to the aperture.

17. The apparatus of claim 14, further comprising at least one color filter filtering the radiation from the source to the sensor so that the apparatus measures the radiance of the source within at least one predetermined wavelength pass band.

18. The apparatus of claim 14, further comprising an integrator and a sampling device that samples an output of the integrator at time intervals that are exponential functions of time to provide the reading.

19. The apparatus of claim 18, wherein the sampling device samples the output of the integrator at time intervals that are powers of 2 of time.

20. The apparatus of claim 18, said integrator including an A/D converter.

21. The apparatus of claim 18, said integrator having a substantially constant resolution at different signal levels.

22. The apparatus of claim 21, said circuit having a dynamic range, wherein said sampling device samples the output of the integrator and provides said reading when the output exceeds a predetermined value relative to the dynamic range.

23. The apparatus of claim 22, wherein the sampling device samples the output of the integrator at time intervals that are powers of 2 of time, and wherein said predetermined value is not more than half or one-third of the dynamic range.

24. A method for measuring transmittance or reflectance of a sample, comprising:

passing radiation that has been transmitted or reflected by the sample to a sensor through an aperture, said sensor responsive to the radiation through the aperture to provide an output; and

integrating the output of the sensor; and

sampling the integrated output of the sensor at time intervals that are exponential functions of time to provide a reading.

25. The method of claim24, wherein the sampling samples the integrated output at time intervals that are powers of 2 of time.

26. A method for measuring transmittance or reflectance of a sample, comprising:

passing radiation that has been transmitted or reflected by the sample to a sensor through an aperture, said sensor responsive to the radiation through the aperture to provide an output;

filtering radiation received at the sensor by a filter having a frequency response that matches that of the human eye; and

providing a reading in response to the output.

27. An apparatus for measuring transmittance or reflectance of a sample, comprising:

a source of radiation;

a sensor;

at least a first and a second substantially equilateral triangular aperture for passing radiation that is from the source and that has been transmitted or reflected by the sample to the sensor through an aperture, said sensor responsive to the radiation through the

aperture to provide an output; and

a circuit providing a reading in response to the output;

wherein the two apertures are oriented so that they are rotated by substantially 60 degrees relative to each other.

28. An apparatus for measuring transmittance or reflectance of a sample, comprising:

a source of radiation;

a sensor;

at least one aperture for passing to the sensor radiation that is from the source and that has been transmitted or reflected by the sample through an aperture, said sensor responsive to the radiation through the aperture to provide an output; and

a circuit providing a reading in response to the output, wherein said circuit includes an integrator and a sampling device that samples an output of the integrator at time intervals such that said integrator has a substantially constant resolution at different signal levels.

29. A method for measuring transmittance or reflectance of a sample, comprising:

passing radiation that has been transmitted or reflected by the sample to a sensor through an aperture, said sensor responsive to the radiation through the aperture to provide an output; and

integrating the output of the sensor; and

sampling the integrated output of the sensor at time intervals to provide a reading such that the reading has a substantially constant resolution at different signal levels.

30. A method for measuring absorbance of a sample, comprising:

passing radiation that is from a source and that has been transmitted through the sample to a sensor through an aperture, said sensor responsive to the radiation through the aperture to provide an output;

passing radiation that is from a source and that has not been transmitted through the sample to a sensor through an aperture, said sensor responsive to the radiation through the aperture to provide an output; and

providing readings in response to the sensor outputs and comparing the readings.